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Streamlined body for dart - has separate flight shaft with plug to retain metal powder in body cavity

CRUSPANE LTD 04.11.76-GB-045980

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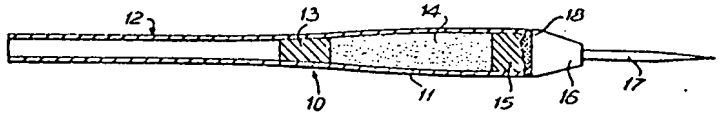
The dart has an elongated body in alignment with a separate front section and a shaft of smaller cross-section extending from the rear to receive a dart flight at the trailing end of the dart. The body is hollow and at least partially filled with tungsten or tungsten alloy.

The filling can be in powdered form, or as a slug of compressed powder. A portion of the shaft can be formed integrally with the body. The tungsten filling can be located between a rear plug, at the joint between the body and shaft, and the front section. The body and integral shaft can be of stainless steel.



1590954 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

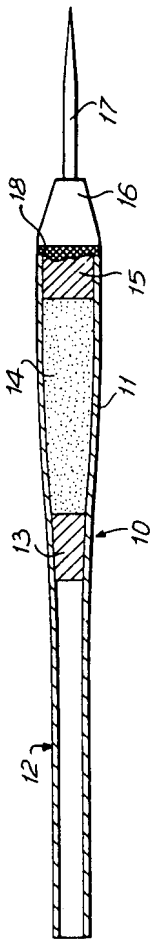


Fig.1

1590954 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

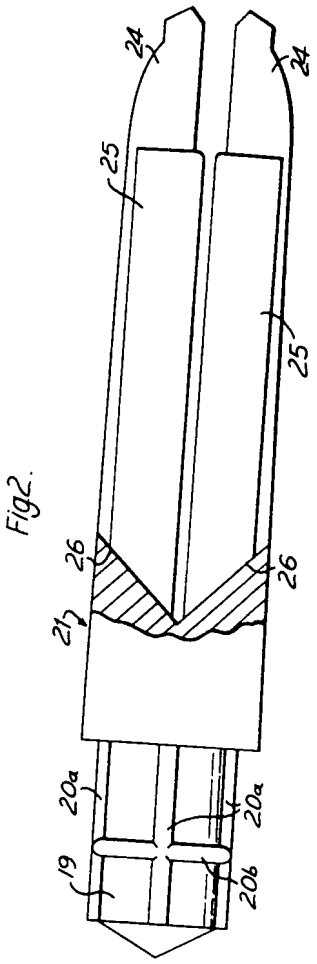


Fig2.

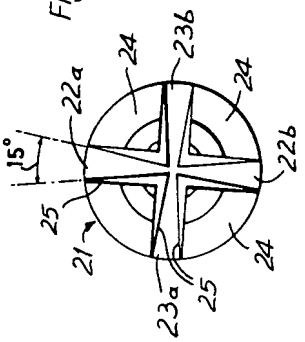


Fig3.

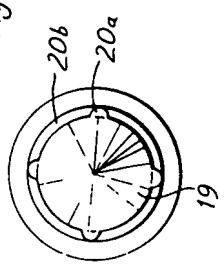


Fig4.

PATENT SPECIFICATION (11) 1 590 954

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(52) Index at acceptance

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1 590 954

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(54) DARTS AND THEIR MANUFACTURE

(71) We, CRUSPANE LIMITED, a British company of 171 Chase Side, Enfield, Middlesex, do hereby declare the invention,

for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to darts and to methods of manufacturing darts.

A dart consists of a body portion connected to a shaft, one end of the body portion carrying a metallic point, which is to penetrate the dartboard, and the remote end of the shaft carrying a flight. The body portion is thicker than the shaft for ease of handling and is also heavier than the shaft in order to position suitably the centre of gravity of the dart.

Normally, the shaft and the body are separately turned, usually from solid metal, and the shaft is then screwed into the body. Recently, darts constructed at least in part of a tungsten alloy have become popular because a larger dart weight can be obtained without requiring a dart of excessive size.

A dart according to the present invention comprises, in alignment, an elongate body portion including separately-formed forward part attached to the main part of the body portion, a pointed needle extending forward from the forward part of the body portion and constituting the leading end of the dart, and a shaft of smaller cross-section than the body portion extending from the rear end of the body portion to receive a dart flight at the trailing end of the dart, the body portion being hollow and at least partially filled with tungsten or tungsten alloy. Preferably at least a portion of the shaft is formed integrally with the body portion. Such a construction permits a good weight/size ratio to be achieved and the dart is easy to manufacture.

The preferred method of manufacturing such a dart comprises drawing a hollow tube to reduce its diameter progressively from a maximum diameter at the portion which is to be the body portion of the dart to a minimum diameter at the portion which is to be the shaft portion, inserting a plug in the hollow tube in the region between the body portion and the shaft, introducing a filling of tungsten or a tungsten alloy into the hollow body portion forward of the said plug, introducing a further plug, which constitutes the forward part of the body portion to which a pointed needle is attached, into the hollow body forward of the said filling to confine the said filling between the plugs, and attaching a flight holder to the shaft portion of the said tube.

The tungsten filling is preferably in the form of a powder and may advantageously be a slug of compressed tungsten powder of a shape suitable for insertion into the hollow body of the dart. The dart is advantageously manufactured from stainless steel but might be made of other metals, in particular of aluminium. A non-metal could be used for the body and shaft but a metal is preferred, one of the advantages of a metal being its ability to resist the impact of other darts.

In order that the invention may be better understood, one example of a dart embodying the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of the dart, with the body portion and integrally-formed shaft portion in section;

Figure 2 is a cross-section through the flight-receiving stub shaft;

Figure 3 is a rear view of the stub shaft of Figure 2; and

Figure 4 is a front end view of the stub shaft of Figure 2.

In Figure 1, a seamless stainless steel tube 10 has been drawn out so that it has a maximum diameter along the leading end portion of its length and then reduces smoothly to a minimum diameter along a trailing end portion of its length.

The larger diameter portion 11 of the tube constitutes the body portion of the dart and the smaller diameter portion 12 the integrally formed shaft portion. To form the dart, the nylon plug 13 is inserted into the tube 10, from its leading end, and is pushed down until it is prevented from further movement by the

decreasing internal diameter of the tube, the plug 13 being then located substantially at the junction of the body portion and the integrally formed shaft portion. A slug of compressed tungsten powder 14 is then inserted into the hollow body portion of the tube from its leading end, after which the leading end is closed by means of a plug 15 formed on the end of the nose 16 carrying a pointed steel needle 17. A washer 18 of anodised aluminium separates the nose 16 from the tubular body portion 11.

To complete the dart, a flight holder is inserted in the rear end of the hollow shaft portion 12 and a flight is inserted in the holder. An example ofa suitable flight holder is shown in Figures 2 to 4 of the accompanying drawings, although other conventional forms of flight holder can be used. In the stub shaft shown in Figure 2, an end portion 19 is formed with a diameter such that it fits into the open rear end of the shaft portion 12 in Figure 1. The portion 19 is formed with elongate ridges 20a and a circular ridge 20b. The remaining portion 21 of the stub shaft is formed with pairs of alignment slots 22a, 22*b*, 23a and 23b which are mutually perpendicular and which meet at the shaft axis and divide the rear portion of the shaft into four legs or quarters 24. At the rear end of the shaft, the facing surfaces of adjacent legs or quarters 24 are parallel from their external edges to their internal edges. For most of its length however, each of the two surfaces of a leg or quarter 24 is formed with a ramp 25, the adjacent ramps of the two facing surfaces of adjacent legs or quarters converging, as shown in Figure 3, at an inclusive angle of 15°. In addition to providing a very good gripping action to hold a flight in place between the legs or quarters, the ramps 25 also tend to deflect outwardly any following darts which enter the flight slots.

In the example shown, the base 26 of each half-slot makes an angle of 45° with a plane perpendicular to the shaft axis, so that the bases of the four half-slots converge towards the axis. If desired, the bases of these half-slots can be sloped obliquely outwards to provide ramps to cause an oncoming dart to be deflected out of the slots.

The stub shaft shown in Figures 2 to 4 is preferably made of glass-filled nylon.

The filling may be of a tungsten alloy, such as a nickel-tungsten alloy with a 90% tungsten content or a copper-tungsten alloy with a tungsten content of 75—85%. Preferably the tungsten content of such an alloy is at least 75%.

The filling may be in the form of a solid rod of tungsten alloy instead of particles.

The plug 15 may be press-fitted but is preferably secured by adheisve.

The flight-receiving portion of the dart illustrated in Figures 2 and 3 is disclosed and claimed in Patent No. 1,505,383.

WHAT WE CLAIM IS:—

1. A dart comprising, in alignment, an elongate body portion including a separately-formed forward part attached to the main part of the body portion, a pointed needle extending forward from the forward part of the body portion and constituting the leading end of the dart, and a shaft of smaller cross-section than the body portion extending from the rear end of the body portion to receive a dart flight at the trailing end of the dart, the body portion being hollow and at least partially filled with tungsten or tungsten alloy.

2. A dart in accordance with claim 1, in which the filling of tungsten or tungsten alloy is in particulate form.

3. A dart in accordance with claim 1, in which the tungsten filling is formed as a slug of compressed tungsten powder.

4. A dart in accordance with claim 1, 2 or 3, in which at least a poortion of the shaft is formed integrally with the body portion.

5. A dart in accordance with claim 4, in which the tungsten filling is located between a rear plug, located at the junction of the body portion and the integrally-formed shaft portion, and the forward part of the body portion.

6. A dart in accordance with claim 4 or 5, in which the body portion and integrally-formed shaft portion are of stainless steel.

7. A dart in accordance with claim 4, 5 or 6, in which at least the rear end of the shaft portion formed integrally with the body portion is hollow and a stub shaft, constituting a flight holder, fits into and extends rearwardly from the said shaft portion.

8. A dart according to claim 7, in which the stub shaft is formed from a synthetics plastics material.

9. A dart according to claim 7 or 8, in which the rear end of the stub is formed with longitudinally extending slots which intersect at the shaft axis to divide the stub shaft into longitudinally extending legs to permit a dart flight to be received within the slots, and in which over at least the major portion of their lengths the facing surfaces of adjacent ones of the said legs converge in the radial direction towards the axis of the shaft over at least a part of the distance from the outer surface of the shaft to the shaft axis, the convergence extending substantially up to the intersection of the slots.

10. A method of manufacturing a dart in accordance with claim 5, comprising drawing a hollow tube to reduce its diameter progressively from a maximum diameter at the portion which is to be the body portion of the dart to a minimum diameter at the portion which is to be the shaft portion, inserting a

plug in the hollow tube in the region between the body portion and the shaft, introducing a filling of tungsten or a tungsten alloy into the hollow body portion forward of the said plug, introducing a further plug, which constitutes the forward part of the body portion to which a pointed needle is attached, into the hollow body forward of the said filling to confine the said filling between the plugs, and attaching a flight holder to the shaft portion of the said tube.

11. A dart, manufactured by a method according to claim 10.

12. A dart, substantially as herein described with reference to the accompanying drawings.

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